Potential of biochar for managing metal contaminated areas

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Biochar has gained significant focus over recent years because of its many promising beneficial applications. Applied into the soil, it provides many benefits similar to soil organic matter, with longer lasting effects because of its stability. It contributes cation exchange capacity and sorption sites that tend to decrease concentrations of potentially toxic metals in the soil solution. In addition, many biochars are alkaline and contribute a liming effect. Biochar thus can effectuate an immediate decrease in metal bioavailability that may last for an extended period of time, typically decades and more. This is of interest in vegetable crop production, where increasingly stringent standards for trace metal contents in the produced vegetable emerge to guarantee food safety and protect the population from the potential long term hazardous effect of elements. Depending on soil properties, even soils with baseline metal concentrations may still entail an appreciable risk to exceed these standards in the crop. Another application of biochar is in the management of relatively extended, moderately contaminated areas, for example through long term application of metal containing agrochemicals, or through emissions from smelter activities. Conventional engineering based soil remediation is not practically and economically feasible for such areas. Such areas may only be kept under beneficial use provided that the management of these lands accounts for the contamination present. Properly managed, these areas may still be usable for agriculture to produce non-food and even food crops. Nature development of such areas may contribute to increasing biodiversity, improved watershed management and other ecosystem functions. Currently, the cost of biochar prohibit a large scale use of biochar as a soil amendment. However, in the context of a conversion to the bio-based economy, biochar will become more widely available as a side product of the conversion of biomass for production of basic chemicals or for green energy production. Use as a soil amendment may provide a safe beneficial use of these chars, contributing to restitution of organic carbon to soils and carbon sequestration.

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